Attorney Docket: 071469-0306511
Client Reference: PC6025A

REMARKS

Claims 1, 31, and 38 are amended hereby. Claims 35 and 42 are canceled. No new claims are added. Accordingly, after entry of this Amendment, claims 1-34, 36-41, and 43-44 will remain pending. Currently, claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43 are being examined. Claims 4-6, 8, 10-12, 14-16, 18, 21, 23-26, 29, 32-34 have been withdrawn from consideration at this time.

In the Office Action dated November 9, 2006, the Examiner memorialized the combined Restriction Requirement and Requirement for Election of Species that were verbally relayed to the Applicant's representative in October of 2005. The Examiner confirmed the Applicant's election of Invention I, Species 1, encompassing claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43. The Applicant hereby confirms this election, without traverse. Accordingly, the Applicant acknowledges that claims 4-6, 8, 10-12, 14-16, 18, 21, 23-26, 29, 32-34, 39-41, and 44 are withdrawn from further consideration, pending the allowance of a generic claim. The Applicant respectfully reserves the right to file one or more divisional applications, as necessary, directed to the subject matter encompassed by the withdrawn claims.

In the Office Action, the Examiner rejected claims 31, 35-38, and 42-43 under 35 U.S.C. § 102(e) as being anticipated by Carducci et al. (U.S. Patent Application Publication No. 2003/0037880). Claims 1, 7, 9, 17, 19, and 27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okase et al. (U.S. Patent No. 6,228,173) in view of Lingampalli (U.S. Patent No. 6,632,325).. In addition, claims 2, 20, and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okase et al. in view of Lingampalli and further in view of Imafuku et al. (U.S. Patent Application Publication No. 2004/0083970). The Examiner also rejected claims 3 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Okase et al. in view of Lingampalli and further in view of Carducci et al. Finally, claims 28 and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okase et al. in view of Lingampalli and further in view of Perlov et al. (U.S. Patent Application Publication No. 2002/0170672). The Applicant respectfully disagrees with each of these rejections and, therefore, respectfully traverses the same.

Claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43 are patentably distinguishable over the references cited by the Examiner because they

recite a reduced maintenance processing system, a chemical treatment system, and a thermal treatment system that combine a number of features including, among them, a protective barrier that comprises at least one of Al_2O_3, Y_2O_3, Sc_2O_3, Sc_2F_3, YF_3, La_2O_3, CeO_2, Eu_2O_3, and DyO_3. None of the references cited by the Examiner discloses or suggests, either alone or in combination with one another, such combinations. As a result, the Applicant respectfully submits that the claims cannot be anticipated or rendered obvious by the references.

Okase et al. describes a single substrate heat treating apparatus for a semiconductor process system. In the film forming system 1, two CVD apparatuses 4, 6 and two heat treating apparatuses 8, 10 are connected to a common transfer chamber 3. (Okase et al. at col. 4, lines 44-36.) The common transfer chamber 3 is connected to the CVD apparatuses 4, 6 and the heat treating apparatuses 8, 10 via gate valves G5, G6, G7, G8, respectively. (Okase et al. at col. 4, lines 61-64.) Each of the CVD apparatuses 4, 6 is used for forming an amorphous metal oxide film, e.g., a tantalum oxide film, on a target substrate such as a semiconductor wafer. (Okase et al. at col. 5, lines 10-14.) Each of the heat treating apparatuses 8, 10 is used for subjecting the metal oxide film to a reforming process. (Okase et al. at col. 5, lines 14-20.)

Fig. 2 illustrates one heat treating apparatus 22 that is exemplary of the two heat treating apparatuses 8, 10. (Okase et al. at col. 5, lines 31-35.) A worktable 36 is positioned within the heat treating apparatus 22. (Okase et al. at col. 6, line 43, for example.) Below the worktable 36, there is a heat compensating member 66 that includes a thin ring plate 68 made of metal, such as stainless steel. (Okase et al. at col. 6, lines 43-51.) In place of stainless steel, the thin plate 68 may be formed of another heat-resistant and corrosion-resistant material such as a ceramic, e.g., Al_2O_3, an opaque quartz, and the like. (Okase et al. at col. 6, lines 51-54.)

With respect to the thin plate 68, the Applicant respectfully submits that the mere fact that the thin plate 68 may be made from Al_2O_3 is not helpful to the Examiner's rejection of the claims. As Okase et al. makes clear, the thin plate 68 is made from Al_2O_3, not provided with a protective barrier made of Al_2O_3. There is no discussion of any protective barrier on the thin plate 68. Moreover, it is unlikely that one skilled in the art would apply a protective barrier made from at least one of Al_2O_3,

Y_2O_3, Sc_2O_3, Sc_2F_3, YF_3, La_2O_3, CeO_2, Eu_2O_3, and DyO_3 to the thin plate 68, if the thin plate 68 is made from Al_2O_3.

As recognized by the Examiner, there is no discussion of a protective barrier formed on at least a portion of an interior surface of the CVD apparatuses 4, 6 or the heat treating apparatuses 8, 10. Without a discussion of a protective barrier, it stands to reason that there is also no discussion of a protective barrier that comprises at least one of Al_2O_3, Y_2O_3, Sc_2O_3, Sc_2F_3, YF_3, La_2O_3, CeO_2, Eu_2O_3, and DyO_3. As a result, Okase et al. fails to describe one or more of the features recited by the present claims. Accordingly, the Applicant respectfully submits that Okase et al. cannot be relied upon properly to reject any of claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43.

Lingampalli does not cure the deficiencies noted with respect to the Okase et al. and, therefore, does not assist the Examiner with a rejection of the claims. Lingampalli describes an article for use in a semiconductor processing chamber and method of fabricating the same. The Lingampalli invention concerns a metal chemical vapor deposition system (MCVD) that has particular utility for protecting aluminum surfaces of substrate supports against reactions with fluorine and fluorine-comprising fluids. (Lingampalli at col. 3, lines 20-30.) In the discussion of the chemical vapor deposition system 100, Lingampalli states that the walls 106 and bottom 108 are typically fabricated from a unitary block of aluminum. (Lingampalli at col. 3, lines 38-40.) The lid 110 is generally comprised of aluminum. (Lingampalli at col. 3, lines 45-46.) In addition, the showerhead 118 is typically fabricated from aluminum. (Lingampalli at col. 3, lines 51-52.) Also, the support assembly 138 is generally comprised of aluminum. (Lingampalli, col. 4, at lines 38-39.)

A protective coating 220 is typically disposed on at least the upper surface 216 of the support assembly 138. (Lingampalli at col. 5, lines 29-30.) The coating 220 is typically applied to the upper surface 216, but may also be applied to the purge ring 204 and/or alignment pins 206, either individually or as an assembly. (Lingampalli at col. 5, lines 30-38.) Optionally, the coating 220 may be applied to other aluminum surfaces within the chamber 102. (Lingampalli at col. 5, lines 38-40.) For example, the coating 220 may be applied to the chamber itself, the showerheads (including the

gas distribution plates and faceplate), and the blocker plate, among others. (Lingampalli at col. 5, lines 40-42.)

The coating 220 generally comprises a layer of aluminum fluoride (AlF_3), magnesium fluoride (MgF_2) or other material that prevents penetration of fluoride and/or fluoride containing compounds therethrough. (Lingampalli at col. 5, lines 43-46.) Alternatively, a coating 602 may be used that is capable of resisting cracking, flaking and the like when exposed to aggressive materials, such as fluorine, while simultaneously protecting the underlying material from attack from the aggressive environment. (Lingampalli at col. 7, lines 24-33.) The coating 602 is generally identical to the coating 220. (Lingampalli at col. 7, lines 27-28.) The coating 602 is resistant to degradation in harsh environments such as environments containing NF_3. (Lingampalli at col. 7, lines 36-39.)

No-where in Lingampalli is there any discussion of a reduced maintenance processing system, a chemical treatment system, and a thermal treatment system that combine a number of features including, among them, a protective barrier that comprises at least one of Al_2O_3, Y_2O_3, Sc_2O_3, Sc_2F_3, YF_3, La_2O_3, CeO_2, Eu_2O_3, and DyO_3. In fact, the Applicant respectfully submits that the discussion in Lingampalli of aluminum fluoride (AlF_3) or magnesium fluoride (MgF_2) as the coatings 220, 602 that may be employed to resist degradation to a fluorine-containing environment would tend to lead those skilled in the art away from the combination recited by the claims. As a result, the Applicant respectfully submits that Lingampalli cannot be combined with the remaining references to render obvious any of claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43.

Imafuku et al. does not correct the deficiencies noted with respect to Okase et al. and Lingampalli. Specifically, Imafuku et al. describes a vacuum processing device with a processing chamber 2 and an auxiliary vacuum chamber 3 connected to one another via a transfer port 20. (Imafuku et al. at paragraph [0017].) A gate liner 100 is provided at the inner wall of the transfer port 20, is detachable for cleaning, and is made of aluminum coated with an insulating film. (Imafuku et al. at paragraph [0022].) The insulating film is a rare earth oxide spray-deposited film that, in one embodiment, is made from Y_2O_3. (Imafuku et al. at paragraph [0022].) Use of a rare

earth oxide spray-deposited film achieves a high degree of erosion resistance when exposed to a plasma. (Imafuku et al. at paragraph [0022].)

As is immediately apparent, Imafuku et al. does not describe, among other features, a reduced maintenance processing system, a chemical treatment system, and a thermal treatment system that combine a number of features including, among them, a protective barrier that comprises at least one of Al_2O_3, Y_2O_3, Sc_2O_3, Sc_2F_3, YF_3, La_2O_3, CeO_2, Eu_2O_3, and DyO_3. Moreover, the Applicant respectfully submits that the discussion of a Y_2O_3 coating on the gate liner 100, without more, does not provide a motivation for Imafuku et al. to be combined with the remaining references in the manner suggested by the Examiner. As a result, the Applicant respectfully submits that Imafuku et al. cannot be relied upon in combination with the remaining reference to render unpatentable any of claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43.

Carducci et al. also does not cure the deficiencies noted above with respect to the remaining references. Specifically, Carducci et al. describes a dielectric etch chamber with an expanded process window where the processing chamber 100 includes a chamber liner 104, illustrated as a first liner 134 and a second liner 118, disposed adjacent to the walls 106, 108 and the lid 102. (Carducci et al. at paragraph [0055].) The first liner 134 is fabricated from a thermally conductive material such as aluminum, stainless steel, ceramic, or other compatible material. (Carducci et al. at paragraph [0080].) Similarly, the second liner 118 is fabricated from a thermally conductive material such as anodized aluminum, stainless steel, or other compatible material. (Carducci et al. at paragraph [0091].)

Carducci et al. does not describe a construction for the processing chamber 100 including, among other features, a protective barrier that comprises at least one of Al_2O_3, Y_2O_3, Sc_2O_3, Sc_2F_3, YF_3, La_2O_3, CeO_2, Eu_2O_3, and DyO_3. To the contrary, one of the advantages of the invention described by Carducci et al. is the use of chamber surface topography to improve the adhesion of by products deposited on the chamber surfaces. (Carducci et al. at paragraph [0117].) As discussed by Carducci et al., in a conventional fluorocarbon based plasma etch of oxide features, polymeric byproduct formation is common, the by-products accumulate on the surfaces of the two liners 118, 134 and the lid 102. (Carducci et al. at paragraph [0117].) After the deposits

accumulate to a certain thickness, the deposits will begin to flake off, contaminating the semiconductor devices being fabricated thereby. (Carducci et al. at paragraph [0117].) To improve the adhesion of deposits on the surfaces of the processing chamber 100, the interior surface is textured with alternating protrusions and depressions. (Carducci et al. at paragraphs [0118] – [0120].)

In view of the foregoing, the Applicant respectfully submits that Carducci et al. does not assist the Examiner with a rejection of any of claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43. Accordingly, the Applicant respectfully requests that the Examiner withdraw the rejections of the claims for obviousness.

Perlov et al. also does not assist the Examiner with the rejection of any of claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43. Like the remaining references, Perlov et al. fails to describe or suggest a reduced maintenance processing system, a chemical treatment system, and a thermal treatment system that combine a number of features including, among them, a protective barrier that comprises at least one of Al_2O_3, Y_2O_3, Sc_2O_3, Sc_2F_3, YF_3, La_2O_3, CeO_2, Eu_2O_3, and DyO_3. Accordingly, the Applicant respectfully submits that claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43 are patentable thereover.

Perlov et al. describes a method and apparatus for improved substrate handling. A chamber 11 contains a substrate carriage 13 and temperature adjustment plate 15. (Perlov et al. at paragraph [0026].) The substrate carriage 13 has three branches 19a-c, which include substrate supports 21a-b. (Perlov et al. at paragraph [0026].) The substrate supports 21a-b preferably are made of a ceramic such as alumina, quartz, or any other hard material that is compatible with semiconductor substrates. (Perlov et al. at paragraph [0027].) There is no discussion, however, of any protective barrier. Moreover, like the thin plate 68 discussed by Okase et al., it is unlikely that one skilled in the art would add a protective barrier to the substrate supports if made from alumina, for example. Accordingly, Perlov et al. does not assist the Examiner with a rejection of any of claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and 42-43. As a result, the Applicant respectfully requests that the Examiner withdraw the rejections.

Each of the Examiner's rejections having been addressed, the Appllicant respectfully submits that claims 1-3, 7, 9, 13, 17, 19-20, 22, 27-28, 30-31, 35-38, and

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42-43 are now in a condition for allowance. The Applicant, therefore, respectfully requests that the Examiner withdraw the rejections of the claims and pass this application quickly to issuance.

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Respectfully submitted,

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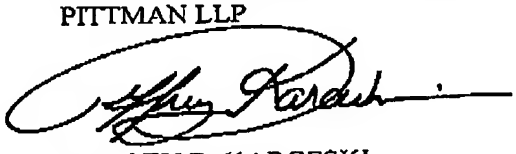

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